The Correct Name for the Hawaiian *Gossypium*

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FOR ALMOST A CENTURY the endemic Hawaiian *Gossypium* has been known as *G. tomentosum.* This species has received much attention especially in recent years since it has been thought by some to form together with the two American cultivated cottons, *G. hirsutum* L. and *G. barbadense* L.,[2] a small section of closely related species with a similar distinctive origin. The section is unique within the genus in that its three related species, as interpreted by Hutchinson, Silow, and Stephens (1947), are allotetraploids reputedly having derived one genome from the diploid American complex and another from the group to which the Asiatic and African cultivated cottons belong. Naturally species with apparently as bizarre an origin as these three have been frequently discussed in the cytological, genetical, and phytogeographical literature. As a result the name *G. tomentosum* has become very well known indeed for the Hawaiian plant. Unfortunately for the sake of stability, this application of the name does not appear to withstand scrutiny.

Although the native Hawaiian *Gossypium* was collected by the naturalists on both the expeditions of Cook, who discovered the Islands in 1778, and of Vancouver, who visited in 1792 and 1793, it was apparently first considered as a distinct and undescribed species by Nuttall who wintered in Hawaii from January–March 1835 and perhaps again the following winter. However, he failed to publish the results of his study. Seemann encountered Nuttall's Hawaiian collections in the British Museum while preparing his account of the genus as it occurred in Fiji. He concluded that the Hawaiian specimens were conspecific with plants representing what he presumed to be an undescribed cotton introduced into Fiji. He adopted Nuttall's unpublished herbarium name, provided a description, and cited specimens of his own and, in addition, of Pritchard and of Smythe from Fiji and also collections of Nelson, Menzies, Nuttall, and Diell from the Hawaiian Islands.

Seemann's instructions from the British Colonial Office directed him to pay particular attention to Fiji as a possibly important cotton producing area. These islands had been provisionally ceded to Great Britain in 1859 and a small party including Seemann was sent to evaluate the state of this Melanesian kingdom before formally accepting its responsibility. Seemann's investigation during his 8 months residence resulted in his enthusiastic conviction that "the Fijis seem as if made" for the cultivation of cotton. It is therefore quite certain that Seemann paid particular attention to the genus as represented in Fiji. Four species were recognized, all of which were thought by him to be introduced. Because of the rarity of Seemann's "Flora Vitiensis," it seems desirable to include here both the description and the comments made by him concerning the species in question.

4. *G. tomentosum,* Nutt. mss.; fruticosum; ramulis foliis bracteisque cano-tomentosis foliis 3–5 lobis, lobis ovatis acuminatis v. acutis integerrimis obscure v. distincte punctatis; stipulis cordatis v. ovatis acuminatis; pedunculis 1–2-floris; bracteis ovato-oblongis, basi cordatis, apice laciniatis, laciniis ovato-lanceolatis integerrimis; calyce subtruncato distincte nigro-punctato; petalis (flavis) obovatis, extus in parte exteriori tomentosis, in parte inclusa latiore tenuiore glabris; capsulis 3-valvis, valvis apiculatis; seminibus liberis

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[2] This name is used in its traditional sense and no attempt is made here to evaluate the conclusion by Prokhanov (1959) that *G. barbadense* is merely a broad-leaved variety of *G. arboreum* L. and hence that the proper name for the species which includes the sea island cotton is *G. peruvianum* Cav.

dense croceo-velutinis, lana (¾ unc. long.) crocea.—*G. religiosum,* Roxb. Fl. Ind. vol. iii, p. 185, non Linn. *G. parvifolium,* Nutt. Herb.—Viti Levu, on the Rakiraki coast (Smythe!), Kadavu (Pritchard! Seemann! n. 28). Also collected in Oahu, Atoi, Hawai (Diell! Nuttall!), Maui, Sandwich Islands (D. Nelson! Menzies!).

This is the plant which A. Gray (Bot. Wilkes, p. 179) calls *G. religiosum,* but it is not that of Cavanilles, which is more glabrous, has a deeper-cleft calyx, white flowers, and the seeds quite glabrous, after the removal of the wool.[3] The Sandwich Islands plant is apparently identical with that described by Roxburgh l. c. under the name *G. religiosum,* which, he says, has "seeds free, clothed with firmly-adhering, short, tawny down, and long wool of the same colour." There is a specimen of "Yellow Cotton" from Joynegau (Trove!) at the British Museum, which has very small leaves,—the smallest I have seen in this genus,—agreeing as far as it goes with the above species; and there is a starved specimen of *G. tomentosum* from Hawai (Diell!) which has the leaves almost as small, and which Nuttall had provisionally named *G. parvifolium.* But generally the leaves and flowers of *G. tomentosum* are those of the size usual in this genus.[4]

A considerable number of the features mentioned in the quoted description are definitely not diagnostic for they are to be found in many species of *Gossypium.* More important, many of these described features are to be found in both the Hawaiian endemic and the Fijian cotton which Seemann, Pritchard, and Smythe all collected 100 years ago. Certain of the features described in the original publication, however, clearly exclude either the Hawaiian endemic or the Fijian introduction and these features will be discussed briefly below.

The stipules of the Hawaiian species are described as "minute" by Watt (1907) and "subulate" by Degener (1933). The stipules of the variant of *G. hirsutum* to which Seemann's No. 28 belongs are described by Watt as "broad, oblique, ovate lanceolate . . . subcordate." Obviously Seemann's description of the stipules of *G. tomentosum* in his original description were not from the Hawaiian plant to which the name has been applied but from the Fijian cotton.

The involucral bracts of the Hawaiian species possess small triangular teeth, each at most two or three times longer than their width and not deeply laciniate as they are in the cotton from Fiji collected by Seemann. Again, it is obvious from Seemann's account that this described feature of *G. tomentosum* was taken from the introduced Fijian plant.

Seemann's key to the species of *Gossypium* found in Fiji states that the seeds of his *G. tomentosum* retain tawny "moss" after the removal of the wool. All authors are agreed that the seed-hairs of the Hawaiian species are not separable into "fuzz" and "floss." Seemann's description states that the trichomes of *G. tomentosum* are about ¾ inch long (= c. 1.9 cm), while those of the Hawaiian endemic are stated seldom to exceed 1 cm in length.

In contrast to all of the above described features, which could never have been observed on the Hawaiian plant, the subtruncate calyx could scarcely have been observed except on the Hawaiian specimens, inasmuch as the Fijian plants would be expected to possess the pronounced calycine teeth characteristic of most of the *hirsutum* cottons.

Watt (1907:69–71) first pointed out that Seemann was in error in associating specimens from Fiji with collections made by Nuttall in Hawaii. Watt then in effect proposed to typify the name *G. tomentosum* by the Hawaiian element included in the original description and in this interpretation he has been followed by all subsequent authors. However, it is readily apparent that the greater portion of Seemann's original diagnosis can apply only to the Fijian cotton and clearly excludes the Hawaiian endemic. The typification of such taxa which, when originally published, contained two or more elements has often proven itself to be a most difficult problem. In an effort to provide broad principles for the solution of such problems a guide for the determination of types has been added to the International Code (Lanjouw, 1961: 65) and includes the following instruction as to proper procedure:

d. In choosing a lectotype, any indication of intent by the author of a name should be given preference unless such indication is contrary to the protologue. . . .

e. In cases when two or more elements were included in or cited with the original description, the

[3] This footnote quoted Solander's manuscript description of the cotton found in the Society Islands, which is apparently what has been called *G. taitense* Parl.—R.L.W.

[4] This footnote provided the original description of *Gossypium drynarioides* Seem. = *Kokia drynarioides* (Seem.) Lewton.—R.L.W.

reviewer should use his best judgment in the selection of a lectotype, but if another author has already segregated one or two elements as other taxa, the residue or part of it should be designated as the lectotype if its essential characters correspond with the original description. If it can be shown that the element best fitting the protologue has been removed, it should be restored and treated as the lectotype. Whenever the original material of a taxon is heterogeneous, the lectotype should be selected so as to preserve current usage unless another element agrees better with the protologue (Rec 7B).

f. The first choice of a lectotype must be followed by subsequent workers (Art. 8) unless the original material is rediscovered, or unless it can be shown that the choice was based upon a misinterpretation of the protologue.

The protologue is defined in the Code as everything associated with a name at its first publication.

It therefore seems certain that the name *G. tomentosum* must be typified by the plants principally characterized by the publishing author who studied them with considerable care in the field. The original account certainly better fits the Fijian introduced cotton than it does the Hawaiian endemic. It is an error to typify the name by the element which Seemann mistakenly considered as conspecific on the basis of rather fragmentary herbarium specimens, even if the name suggested by Nuttall was adopted by Seemann for the proposed species. A photograph of Nuttall's specimen in the British Museum was kindly provided by J. E. Dandy, who also wrote that he could find no manuscript notes by Nuttall that Seemann might have used. The secondary position of the Hawaiian element in Seemann's concept may perhaps even be indicated by his appending their localities and collectors after the citation of the Fijian specimens with the prefectory "Also collected in Oahu . . .".

The authority for the name *G. tomentosum* has been variously cited as "Nutt." or "Nuttall," "Nuttall in Seem." or "Nutt.; Seem." The last of these citations of authority is given sanction in the modernized version by the substitution of "ex" for the semicolon by the International Code as an example for Recommendation 46C. Although Seemann attributed the name to "Nutt. mss.," an examination of the description indicates that Seemann based his description almost entirely upon the plants studied by him in Fiji. In this case there are more compelling reasons than the desire to shorten the citation for attributing the name solely to Seemann rather than to "Nutt. ex Seem."

The year following Seemann's publication of *G. tomentosum,* Parlatore (1866) published a good description and an illustration of the Hawaiian endemic, naming it *G. sandvicense*—not *G. sandwicense* as cited by Hillebrand (1888), Watt (1907), Degener (1933), or Hutchinson, Silow, and Stephens (1947). Parlatore questioningly placed Nuttall's herbarium name in synonymy. The name *G. indicum* Lam. employed by Menzies, in naming his collection made while accompanying Vancouver, was also cited in synonymy along with "*G. religiosum* Forst.," the name under which David Nelson's collection, made during Cook's voyage of discovery, was to be found in the British Museum.

The more pertinent synonymy for the Hawaiian endemic *Gossypium* appears, then, to be as follows:

Gossypium sandvicense Parl., Sp. dei Cotoni p. 37. 1866.

G. tomentosum Seem., Fl. Vit. 22. 1865 in small part.

G. tomentosum var. *parvifolia* Nutt. ex Watt, Wild & Cult. Cotton Pl. p. 71. 1907.

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